

MARK SCHEME: PHYSICS PAPER 232/2

1. The flask contracted first causing the water level to rise. Further cooling causes the water level to drop as water contracts faster than glass.
2. i) Adjust the position of the lens until a sharp image of the flame is observed ✓1
  - Record the object distance (u) and the image distance (V)
  - Repeat with different object positions ✓1
  - Use the relation  $f = \frac{uv}{u+v}$  to determine f ✓1
 ii) Diverging lens produces a virtual image which cannot ✓1 be formed on a screen

1 mark

3.  $v = f\lambda$

$400 \text{ MHz} = 4 \times 10^8 \text{ Hz}$

$3 \times 10^8 = 4 \times 10^8 \lambda$

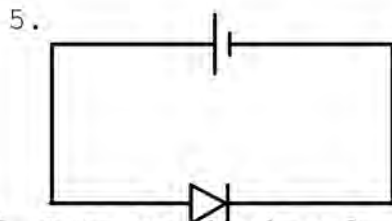
$\lambda = \frac{3}{4} \times 10^0$

$= 0.75 \text{ m}$

$L = \frac{1}{2} \times 0.75 \text{ m} = 0.375 \text{ m}$

4. Metals get charged by induction, the charges are transferred from the electroscope this causes earthing, / charges on the electroscope induce opposite charges on the conductor.

1 mark



6. Sets up a back emf hydrogen insulates the electrode.

7. A = North      B = South

1 mark

8. X = North

Y = South

2 marks

9.

10.

marks

$T = 160 \text{ ms}$

$F = \frac{1}{T} = \frac{1000}{160} = 6.25 \text{ Hz}$

2

11. When the conductors move in a magnetic field, eddy currents are produced. The eddy currents produced a force that oppose their motion. The eddy currents in A are more than in B since slots reduce the eddy currents.

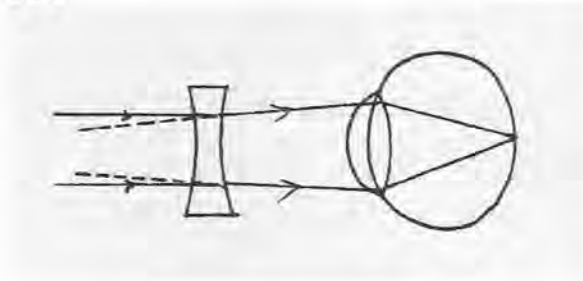
12. It minimizes echoes

13.  $s = 2d$

$$d = \frac{330 \times 2.5 \sqrt{1}}{2}$$

$$d = 412.5M \sqrt{1}$$

14.



#### SECTION B

15. a) i)  $T = 0.06\text{Sec}$   
 $F = 1/T = 16.7 \text{ Hz}$

2

marks

ii) Velocity = displacement (l) / Time (T),  
 Frequency = 1 / period (T)  
 hence,  $V = fl$  2 marks

b) i) They are above 20kHz audible sound  
 1 mark

$$\lambda = v \times t$$

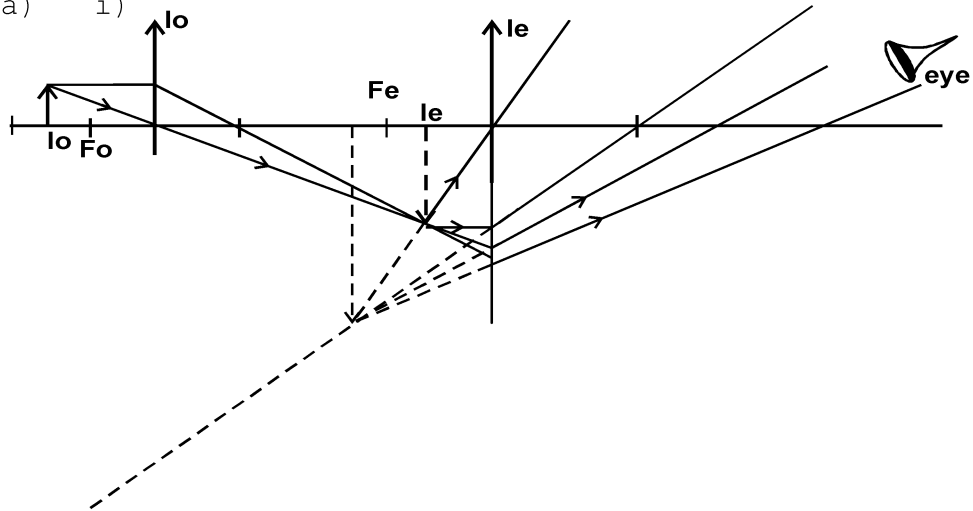
$$\text{marks } 1500 \times 0.8 \times 10^{-4} \text{ s}$$

$$= 0.12m$$

3

iii) One pulse must return before the second one is sent.  
 1 mark

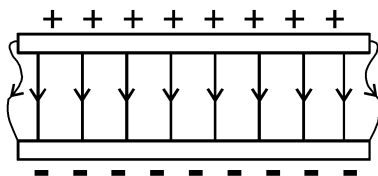
16. a) i)



ii) Image formed by apparent intersection of light of light rays. or images that cannot be formed on the screen. 1 mark

$$b) \quad \text{Distance} = \frac{1500}{2} \times \frac{1.6}{10^4} = 0.12\text{m}$$

17.a)



b) Decrease the distance (d) between plates introduce / change the dielectric material e.g. polythene, glass.

c) (i)  $C_{AB} = C_A + C_B$   
 $= 8\mu\text{F} + 6\mu\text{F}$   
 $= 14\mu\text{F}$   
 Total charge,  $Q = VC$   
 $= 90 \times 3.11\mu\text{F}$   
 $= 279.9$  or  $280 \mu\text{C}$   
 Charge on C =  $280 \mu\text{C}$

$$V = \frac{Q}{C} = \frac{280 \mu\text{C}}{4 \mu\text{F}} = 70 \text{volts}$$

$$(90 - 70) = 20 \text{ volts}$$

$$\text{P.d. on (A + B)} =$$

$$Q_A = C_A \times V = 8\text{mF} \times 20 = 160\text{mc}$$

$$Q_B = C_B \times V = 6\mu\text{F} \times 20 = 120\mu\text{c}$$

ii)  $\text{P.d } V_C = \frac{280\mu\text{c}}{4} = 70\mu\text{c}$

P.d. ( $V_A$ ) = 20 volts

P ( $V_B$ ) = 200 volts

18. a) i) Lenz's law: the induced current is always such that it opposes the change of magnetic flux which produces it.
- ii) The magnitude of the induced e.m.f is directly proportional to the rate of change of magnetic flux.

b)

Secondary	A	Output voltage
2500	A	115V
5000	B	230V

c) i) Yes, tie the 13A fuse is suitable.

ii) Energy = 750 × 4 × 3 hrs

Units = 9kwh

Cost = 9 × Shs 15

= shs 35

19. a) Light must travel from denser to less medium ✓1
- Angle of incidence in the denser medium must exceed the critical angle ✓1

b)  $\frac{\sin i}{\sin r} = {}_1n_2 \checkmark 1$

Since  $i = 90$   $r = \theta$

$${}_1n_2 = \frac{\sin i}{\sin r} = \frac{\sin \theta}{\sin 90} = \frac{\sin \theta}{1} \checkmark 1$$

$${}_1n_2 = \frac{1}{\sin \theta} \checkmark 1$$

**Alternatively / or**

$$2n_1 = \frac{\sin i}{\sin r} = \frac{\sin \theta}{\sin 90} = \sin \theta$$

$$1n_2 = \frac{1}{1n_2} = \frac{1}{\sin \theta}$$

$$1 \eta 2 = \frac{1}{\sin \theta}$$

c) i)  $\sin \theta = \sin c = \frac{1}{\eta} = \frac{1}{1.31} \checkmark 1 = 0.763$

$$\theta = 49.8^\circ \checkmark 1$$

ii)  $x = 90 - \theta \checkmark 1 = 40.2^\circ \checkmark 1$

iii)  $\frac{\sin \theta}{\sin x} \checkmark 1 = A = 1.31; \sin \theta = 1.31$

$$\sin 40.2 = 0.846$$

$$\theta = 57.8^\circ \checkmark 1$$

20. a) - Risk of electric shock in case pole collapses  $\checkmark$

- Can cause fires to vegetation and structures  $\checkmark$
- Harmful effects from e-m radiations due to effects of electric field.

b) i)

- Fuse is connected to the neutral wire  $\checkmark$  instead of live wire.
- Bulbs are connected to the neutral wire which is at zero potential instead of the live  $\checkmark 1$  wire

ii)

- So as to receive the full voltage  $\checkmark 1$  from the source.  $\checkmark 1$

c) i) An a.c generator (dynamo)  $\checkmark 1$

ii) A - armature  $\checkmark 1$

B - slip rings  $\checkmark 1$

iii) The voltage of the induced e.m.f  $\checkmark 1$  doubles  $\checkmark 1$

d) i)  $f = \frac{1}{T} = \frac{1}{0.1} \checkmark 1$

$$= 10 \text{Hz} \checkmark 1$$

ii) The slip rings have been replaced by split  $\checkmark 1$  rings (commuters)